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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

VALENTINE, JAMI M

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/566,838	Applicant(s) PULLINI ET AL.	
	Examiner JAMI M. VALENTINE	Art Unit 2894	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the Application

1. Acknowledgement is made of the amendment received 12/29/08. **Claims 18-23** are pending in this application. Claims 18-23 were amended, claim 1-17 and 24-41 were cancelled in the amendment received 12/29/08. Acknowledgement is made of the replacement drawings and amendments to the specification received on 12/29/08

Specification

2. The disclosure is objected to because of the following informalities: repeated paragraphs and errors. Applicants amendment beginning on page 8 line 4 to page 9 line 5 are substantially identical with the exception of labeling the spin valve "10" in the first paragraph and "110" in the second paragraph. These paragraphs refer to figure 3, but figure 3 does not include a reference label "10". Appropriate corrections is required.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a) because they fail to show a spin valve comprising a plurality of layers arranged in a stack which in turn comprises at least one free magnetic layer able to be associated to a temporary magnetization (MT), a spacer layer and a permanent magnetic layer associated to a permanent magnetization (MP), wherein said spacer element is obtained according to a method of manufacturing a magnetoresistive element comprising regions having metallic conduction and regions having semiconductive conduction wherein said method comprises the following operations: forming metallic nanoparticles to obtain said regions with metallic conduction; providing a semiconductor substrate ; applying said

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metallic nanoparticles to said semiconductor substrate to obtain a disordered mesoscopic structure as described in the specification. It is unclear how the spacer layer could be formed by the claimed method and such a structure is not shown in any figures. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **123** (figure 5). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any

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amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
6. **Claims 18-23** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
7. Per **Claims 18 and 20** the following language is indefinite:
 - said spin valve comprising a plurality of layers arranged in a stack which in turn comprises at least one free magnetic layer able to be associated to a temporary magnetization (MT), a spacer layer and a permanent magnetic layer associated to a permanent magnetization (MP);
 - wherein said spacer element is obtained according to a method of manufacturing a magnetoresistive element comprising regions having metallic conduction and regions having semi-conductive conduction
 - wherein said method comprises the following operations:
 - forming metallic nanoparticles to obtain said regions with metallic conduction;

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- providing a semiconductor substrate;
- chemically etching the semiconductor substrate to form pores in said semiconductor substrate; and
- applying said metallic nanoparticles to said semiconductor substrate having pores in order to obtain a disordered mesoscopic structure.

8. First, there is a lack of antecedent basis for the use of "spacer element". It is unclear if this is the same as the previously recited "spacer layer". To facilitate examination, the "spacer element" and the "spacer layer" are assumed to be the same part.

9. The first section of the claim requires a stack which in turn comprises at least one free magnetic layer, a spacer layer and a permanent magnetic layer. This means that the spacer layer is between the free magnetic layer and the permanent magnetic layer. The claim goes on to describe the method of manufacturing spacer element. This method includes providing a semiconductor substrate, etching the substrate, forming pores and applying metallic nanoparticles to the substrate in order to obtain a disordered mesoscopic structure. This method is inconsistent with the claimed spacer layer. A substrate is typically the surface upon which other elements are placed. In this claim, it appears that the substrate is part of the spacer layer which is not consistent with the typical meaning in the art. Further, it is unclear what the result of the method produces: Is the substrate part of the spacer element? Is the spacer element the same as the disordered mesoscopic structure? Additionally, another reasonable interpretation is that the method of etching the substrate and applying the nanoparticles is performed before the spacer layer.

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10. Further, Applicants specification does not support for a spacer layer where the mesoscopic portion of the spacer layer is a semiconductor. Applicant's disclosure does not aid in clarification since the figure which appears to show the spacer element (123) in figure 5, is not described in the specification.

11. Claim 20 requires that the spacer element comprise a matrix which is a dielectric—this appears to be in conflict with the claimed use of a semiconductor substrate to form the spacer layer.

12. For these reasons, one of ordinary skill in the art would not be reasonably apprised of the scope of the invention and this claim is rendered indefinite.

13. Claims 19-23 depend from rejected claim 18, include all limitations of claim 18 and therefore are rejected for the same reason.

Claim Rejections - 35 USC § 102

14. **Claims 18-23** are rejected under 35 U.S.C. 102(b) as being anticipated by Fujiwara et al. (US Patent Application Publication No 2002/0054461) hereinafter referred to as Fujiwara.

15. Per **Claim 18** Fujiwara (e.g. figures 3a and 3b) discloses a magnetic device, comprising a spin valve, said spin valve comprising a plurality of layers arranged in a stack (e.g. figure 3a) including at least one free magnetic layer (31), a spacer element (33) and a permanent magnetic layer (32); wherein said spacer element includes a disordered mesoscopic structure which includes metallic nanoparticles (33a) applied to a semiconductor substrate (33b). [0021-0022]

16. Claim 18 includes "product-by-process" limitations. While product-by-process claims are limited by and defined by the process, determination of patentability is based on the product

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itself. *In re Hirao*, 190 USPQ 15 at 17(footnote 3). The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) See also *in re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 116 *in re Wertheim*, 191 USPQ 90 (209 USPQ 254 does not deal with this issue); and *In re Marosi et al*, 218 USPQ 289 final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above case law makes clear.

17. Additionally, claim 18 recites the performance properties of the free magnetic layer (e.g. able to be associated to a temporary magnetization (MT); and the permanent magnetic layer (e.g. associated to a permanent magnetization (MP)). These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Fujiwara. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997) See MPEP 2114. Additionally, these functional limitations are taught by Fujiwara in [0021].

18. Per **Claim 19**, Fujiwara discloses the device of claim 18, including where said spacer element (33) comprises a matrix (33b) and nanoparticles (33a). (see figures 3a-3b.)

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19. Per **Claim 20**, Fujiwara discloses the device of claim 19, including where said matrix (135) is a matrix of dielectric material. [0022]

20. Per **Claim 21**, Fujiwara discloses the device of claim 18, including said spacer element (33) comprises a matrix (33b) and nanoparticles (33a); and said matrix (33b) comprises a porous dielectric material (aluminum oxide, see [0022]; porous, see figure 3b), and the nanoparticles (33a) are contained in pores of said porous dielectric material (see figure 3a-3b).

21. **Claim 22**, recites the intended use of the device. These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Fujiwara. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997) See MPEP 2114.

22. **Claim 23**, recites the intended use of the device. These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Fujiwara. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997) See MPEP 2114.

Cited Prior Art

23. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Reference 1: R. O’Handley, “Modern Magnetic Materials, Principles and Applications”
Wiley and Sons, New York, 2000, page 594.

Response to Arguments

24. Applicant's arguments filed 12/29/08 have been fully considered but they are not persuasive.

25. Applicant argues (page 9) that Figure 3 depicts the spin valve structure as claimed and figures 4a-B provide further detail. The examiner respectfully disagrees. The claimed spin valve structure includes a spacer layer that is formed by etching a semiconductor substrate and applying metallic nanoparticles. This is not shown in any of the figures. The closest figure appears to be figure 5, however, even figure 5 does not show etching a semiconductor substrate and applying metallic nanoparticles to form a spacer layer.

26. Applicant argues (page 9-10) that the amendments to the specification render the objections and rejections moot, the examiner respectfully disagrees. The specification remains objected to as further detailed above.

27. Applicant argues (page 10) that the claimed invention requires and critically uses a porous substrate and that Fujiwara does not. This argument is not persuasive because the invention of Fujiwara anticipates the claimed structure. Applicant argues (page 10) that Fujiwara “is obtained by a structure of nanotubes and nanowires”. The examiner disagrees because Fujiwara describes the layer as a mosaic structure [0022]. However, the examiner notes that a nanotube is a pore! Hence Applicant admits that Fujiwara discloses a porous material.

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28. Applicant argues that Fujiwara does not teach or suggest a porous dielectric material comprising porous alumina or porous silicon—Fujiwara paragraph [0022] discloses alumina (Al_2O_3) where it states oxides of any elements including Al.

Conclusion

29. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMI M. VALENTINE whose telephone number is (571)272-9786. The examiner can normally be reached on Monday-Friday 9am-6pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kimberly Nguyen can be reached on (571) 272-2402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JMV/

/Kimberly D Nguyen/
Supervisory Patent Examiner, Art Unit 2894